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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,461	04/09/2004	Shigao Chen	630666.91063	1075

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EXAMINER	
LAMPRECHT, JOEL	
ART UNIT	PAPER NUMBER
3737	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,461	CHEN ET AL.	
	Examiner	Art Unit	
	JOEL M. LAMPRECHT	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/4/07*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings were received on 8/27/04. These drawings are unacceptable because they are not labeled "Replacement Sheets".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7-11 and 15-19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al (US 2005/0283072) in view of Lin (US 6,068,597). Qin et al disclose a method of characterizing the elasticity of a viscous medium (Claim 27), by directing an ultrasound wave, determining a vibrational velocity, determining a frequency response of the medium and determining an elasticity property as at least partially a function of the resonant frequency (Paragraphs 45-50, 55-58, Claim 13, Paragraphs 97-117). An amplitude modulated, confocal wave is used (Paragraph 37, Fig 1-2), known resonant frequencies are compared to known values (Paragraphs 12-13, 51 and 68, 69), and describes a method using multiple ultrasound sources (Paragraph 41). Qin et al describe sensing vibrational motion with an ultrasound based motion detector, detecting the shear modulus (Paragraph 64, 68 and Claim 21), using a biological tissue (Paragraphs 19-20), varying the focal point across the tissue (Paragraph 39-45), and a processing unit with memory unit to correlate the vibrational

data, frequency data, and compare that data to known frequencies (Paragraphs 16-21, 47, 73-80).

Qin et al do not disclose the use of the acquisition of a "resonance spectrum" from the plurality of data received during imaging to determine resonant frequency. Attention is then directed to the secondary reference by Lin, which discloses the use of ultrasound imaging for the acquisition of resonant spectrums of an object or target to acquire data from a range of vibrational frequencies to acquire resonant frequency data of tissue for velocity measurement (Figure 1-3, 5, Col 6 Line 18- Col 7 Line 13). It would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated the teachings of Lin in the vibrational velocity methods of Qin et al for the purpose of acquiring diagnostic data about patient-specific medical conditions in the body (abstract).

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 10 above and in further view of Mourad et al (US 6,875,186). Qin et al in view of Lin discloses the invention as claimed, in particular, a method of characterizing the elasticity of a viscous medium (Claim 27), by directing an ultrasound wave, determining a vibrational velocity, determining a resonant frequency of the medium and determining an elasticity property as a function of the resonant frequency (Paragraphs 45-50, Claim 13, Paragraphs 97-117). An amplitude modulated, confocal wave is used (Paragraph 37, Fig 1-2), known resonant frequencies are compared to known values (Paragraphs 12, 51 and 68, 69), and describes a method using multiple ultrasound sources (Paragraph 41). Qin et al describe sensing vibrational motion with an ultrasound based motion detector, detecting the shear

modulus (Paragraph 64, 68 and Claim 21), using a biological tissue (Paragraphs 19-20), varying the focal point across the tissue (Paragraph 39-45), and a processing unit with memory unit to correlate the vibrational data, frequency data, and compare that data to known frequencies (Paragraphs 16-21, 47, 73-80).

Qin et al in view of Lin does not disclose differentiating a first type of tissue from a second type of tissue, even though it would be a requirement to know which sort of tissue is being analyzed to specify bone tissue as a target, does not disclose searching for calcifications, nor characterization as a function of time, though the properties of resonance vibro-acoustography are time and frequency dependent. Attention is then directed to the secondary reference by Mourad et al which teaches the use of a similar system and method for the classification of tissues which are dead, dying, hardening, or undergoing pathological or immune responses. Specifically Mourad et al teach a method of characterizing tissues (Col 13 Line 25 – Col 14 Line 40) as a function of time to determine pathologies including a hardening or density change within tissues (Col 15 Line 15-27). It would have been obvious to one having ordinary skill in the art at the time of the invention to have used the ultrasound tissue classifications disclosed within Mourad et al in the ultrasound tissue property methods of Qin et al in view of Lin for the purpose of distinguishing tissue properties and classifying tissues differently based on pathologies.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 1 and in further view of Blofgett et al (US 2004/0077949). Qin et al in view of Lin disclose all that is listed above, but fail to disclose the use of a laser vibrometer for the purpose of sensing the vibrational motion

of the medium being studied. Blofgett in the area of ultrasonic tooth structure classification disclose a method for sensing vibrational motion with a laser vibrometer (Paragraphs 10-14). It would have been obvious to one having ordinary skill in the art at the time of the invention to have used the laser vibrometer method disclosed by Blofgett et al in the methods taught by Qin et al in view of Lin as it is a complimentary technique for the remote sensing of ultrasonic waves (Paragraph 12).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 15 and in further view of Sarvazyan (US 5,606,971). Qin et al in view of Lin discloses the invention as described including all that is listed above, but fails to disclose the use of a magnetic resonance elastography system for the detection of velocity and frequency vibrations. Attention is then directed to the secondary reference by Sarvazyan which discloses in Figure 3 and columns 5 and 6, that both ultrasound systems and MR elastography systems are common and can be used for the classification and diagnosis of tissue properties. It would have been obvious to one having ordinary skill in the art at the time of the invention to have substituted an ultrasound based motion detector as taught by Qin et al in view of Lin for the MR elastography methods taught by Sarvazyan as they are both capable of detecting shear waves from a source (Col 5 line 60 –Col 6 line 6).

Response to Arguments

Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection. Regarding the argument that the Qin et al reference (2005/0283072) does not disclose resonance as a term, the Examiner reminds Applicant of the definition of resonance being: "a vibration of amplitude in a

mechanical or electrical system called by periodic stimulus of the same or nearly the same period as the natural vibration of the system". From this definition and an understanding of the concept of frequency of a vibration or emission, it should then be clear that the returned vibrations from the focal point of the methods of Qin et al are at least "resonant vibrations" that is they occur as a function of the resonating of the object being scanned acoustically. The resonant frequency of an object is the frequency at which the object tends to resonate (Both definitions Merrian-Webster).

The return vibrations from the Qin reference are acknowledged as not being entirely dependent on the resonant frequency of the object; however, the components of the information include resonant frequency information, acoustic reflectivity, and tissue elasticity as is widely known in the field of vibrational Doppler imaging (US patent 6,068,597 gives a clear showing of the components of VDI data). Additionally and remaining in the disclosure of the art of record, patent number 5,119,820 which is incorporated by reference in Column 9 Line 25 – Column 10 Line 27 an attenuation process for determining frequency component spectrums of reflected signals.

For at least these reasons the disclosure of Qin et al does indeed provide a material elasticity property at least in part as a function of a repetitive vibrational process at multiple frequencies to establish response data at frequencies from the resonating object. The range of frequencies used within the Qin et al patent are at least consistent to those known for testing the resonant frequency of long bones, as tibia testing occurs on the order of 10-20Hz (Journal of Orthopaedic Trauma, 10(1):50-62 January 1996).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL M. LAMPRECHT whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ruth S. Smith/
Primary Examiner, Art Unit 3737

JML